STATE OF MONTANA
MONTANA DEPARTMENT OF TRANSPORTATION
JOB PROFILE

☐ Update

☐ Formal Review

Date Submitted _____

SECTION I - Identification

Working Title:
Civil Engineer Specialist

Department:
Transportation

Job Code Number:
172516

Division & Bureau:
Engineering Division
Materials Bureau

Job Code Title:
Civil Engineer Specialist

Section & Unit:
Pavement Analysis Section
Pavement Management Unit

Pay Band: 6

Work Address:
2701 Prospect Ave.
Helena, MT 59601

Position Number: 40104

Phone: 406-444-6154

☐ FLSA Exempt ☑ FLSA Non-Exempt ☐ Non-Union ☐ MPEA ☐ Blue Collar

Profile Completed By:
Mary Gayle Padmos
Pavement Management Engineer

Work Phone: 406-444-6149

Work Unit Mission Statement or Functional Description:

The MDT's mission is to serve the public by providing a transportation system and services that emphasize quality, safety, cost effectiveness, economic vitality and sensitivity to the environment.

The Highways and Engineering Division prepares projects for bidding and coordinates highway construction. The Division is made up of the Materials, Construction, Right-of-Way, Bridge, Traffic and Safety, Environmental Services, Engineering Oversight, and Preconstruction bureaus; the CADD Systems and Engineering Management Support sections; and five District Construction Offices in Missoula, Butte, Great Falls, Glendive, and Billings for budget and workforce purposes.

The principal goals of the Materials Bureau of the Department of Transportation are to develop and implement comprehensive data collection, testing, and analysis programs that facilitate pavement project selection and pavement surface and subsurface design that addresses Montana's most

important statewide transportation needs and to support the quality of materials incorporated into Montana's highway system. These activities help officials select projects and provide information for short and long-range engineering and construction programs. These goals are addressed through the complex interaction and interrelationship of the Bureau's three Sections. The Bureau consists of the Geotechnical Section, Physical Testing Section, and Pavement Analysis and Research Section.

The Pavement Analysis Section's mission is to gather, arrange, and analyze transportation data in a competent, precise and purposeful manner; provide suitable and cost effective pavement designs and treatments for rehabilitated roadways statewide. The Section collects pavement distresses, stress/strain information, and geotechnical information for existing roadway, current and future traffic, construction phasing and roadway plans and uses deflection data to determine feasible overlay alternatives. The Section develops, maintains, and administers complex, comprehensive data collection and engineering analysis programs and maintains comprehensive condition, deflection, research, and surfacing databases used in highway design, highway maintenance, transportation planning, safety, materials, federal certification, university research, and allocation and distribution of maintenance funds and federal highway funds in accordance with statutory funding formulas. The Section maintains and administers several elements of the MDT Project Management System, Pavement Management System, AASHTO Pavement Design System, Nondestructive Testing Program, Local Transportation Assistance Program, University Research Program, and Materials Information System. The Section is also responsible for providing information and analysis for external customers such as Federal Highways, Federal Forest Service, Federal Park Service, consultants, and Montana County and Local governments in the areas of pavement design, management, and research. The Section evaluates special studies and plans, provides executive management with empirical data for complex, potentially controversial decisions regarding pavement project selection, pavement design, and pavement maintenance and is responsible for the statistical accuracy of reports to MDT executive management, Divisions, and external customers.

Describe the Job's Overall Purpose:

The Civil Engineering Specialist performs advanced professional engineering work in the collection, analysis, interpretation, and reporting of complex data and development of pavement performance models using advanced mathematical and statistical methods. Specifically, the CE Specialist is responsible for developing, coordinating, producing, and analyzing condition data, performance models, and computer software that are used to annually report the engineering and economic effect of current and forecasted pavement condition. This includes analyzing and reporting the effect of various programming strategies on the Construction and Maintenance Improvement Programs. The CE Specialist reports to the Pavement Management Engineer.

SECTION II - Major Duties or Responsibilities

This section should be a clear concise statement of the position's major duties and the approximate percent of work time for each duty ***% of Time***

A. Materials Research and Analysis 55%

1. Analyzes and evaluates pavement condition data to develop technically defensible results and conclusions related to performance of materials under varying influences (e.g., weather, topography, stresses, etc.). Researches, analyzes, and determines probable causes of and treatments for pavement deficiencies. The CE Specialist analyzes the most complex projects within the Pavement Management System (PvMS) that may be the result of materials characteristics, data collection methods, or information system operations.

2. Develops and oversees pavement performance models to forecast pavement conditions and determine optimum treatment methods that ensure safety while promoting efficient and cost-effective maintenance and repair. The CE Specialist utilizes specialized computer applications, analytical results, and materials engineering theories and principles to develop and evolve performance models. Oversees information systems development and administration related to performance models.

3. Directs specialized pavement research and analysis projects in response to specific requests. This includes forensic studies of failing pavements, PvMS data analyses, performance trends and characteristics, and a range of other interests. Develops original research and analysis methods, standards, tools, as necessary *assigns tasks* to fulfill specialized requests .

4. Evaluates advanced software designs and modifications performed by consultants to ensure that products conform with specifications, provide compatibility with existing MDT information systems, and provide efficiency and cost-effectiveness. Plans and develops new or modified system functions and operations; coordinates with vendors throughout software design and testing phases; and identifies and explains technical problems to ensure effective system operations. This includes analyzing and explaining data relationships, locations, collection methods, relevance, and other statistical and mathematical considerations to ensure the system meets advanced data analysis needs.

5. Develops, tests, and establishes engineering standards and criteria, specific to MDT methods of data collection and analysis, for assessing the quality of pavement materials. This includes evaluation of engineering, mathematical, and scientific principles; specialized information systems technologies; and materials characteristics to develop various standards (e.g., distress converter levels, maximum allowable extent levels, pavement condition indices, etc.).

6. *Oversees* and ensures the accuracy, efficiency, and overall quality of data collection and analysis projects. This includes assessing data collection procedures, equipment, and results; data management system capabilities and limitations; and materials standards. Control quality assurance practices for van operators in the unit's data collection processes. This entails coordinating with the operators that they are using identical procedures, forms and documentation for calibrations, collection and reporting.

7. *Administers* the automated data collection workstations. This involves managing the pavement condition and image data collected by the Pathway vans. Overseeing the automated analyses (rutting and cracking), ensuring data backup and transfer to ISD. Interacts with ISD regarding ImageViewer data files to ensure video collected meets ImageViewer requirements. This includes coordination of route collection, schedule and video quality. Informing ISD when image data is available for upload to viewer application.

8. Researches and evaluates construction costs in order to establish and maintain a database of current treatment costs. Performs life cycle analysis and cost modeling of various treatment types and makes recommendations for the use of pavement life cycles in performance modeling.

B. Report Generation 30%

The CE Specialist develops reports that are tailored to specific audiences. Reports and presentations must be accurate, applicable, and presentable in a manner for easy assimilation by public officials, including Legislators, the Governor's staff, the Director's staff, MDT Administrators, Federal Highway Administration Officials and others. Due to the impact of the reports and presentations on taxpayers and/or the traveling public and on the Construction and Maintenance Improvement Programs, the reports and presentations will be subject to close scrutiny and controversy. Therefore, it is imperative that all reports and presentations are presented in a clear concise manner and are developed using statistically valid data, models, and techniques that can withstand critical review by department and non-departmental personal. If questions or explanation of the reports and presentations are needed,

the incumbent is responsible for the verbal and written defense and explanation of the engineering data, models, procedures, and results of the reports.

1. Develops and presents comprehensive analytical reports on pavement conditions, influences, and treatments for Montana's 24,000 lane miles of roadway. Anticipates information and project needs of MDT staff and others to compile, analyze, and report on relevant issues. This includes cyclical and specialized reports intended to translate highly technical information to various audiences (e.g., engineers, planners, local officials, etc.) by incorporating computerized designs, presentation tools, and statistical representations.

2. Provides current pavement condition and treatment recommendations to the Department via annual reporting mechanisms that include hard copy reporting, internal electronic forms and web reporting.

3. Provides verbal and written defense and explanation of the engineering data, models, procedures, and results of the reports. Maintains report development and documentation, monitors customer feedback and makes appropriate modifications.

C. Pavement Research and Special Studies 10%

1. Uses data from the Pavement Management System and the skilled use of computers to perform research and analysis on pavements, as requested by users. This research includes performing pavement forensic studies on exceptionally well performing pavements and pavements that are prematurely failing. Conclusions and recommendations are generated using reports, graphs, spreadsheets, bar charts, pie charts and computer generated slide presentations.

2. Represents the Bureau on technical research committees, advisory panels, workgroups, and other meetings to provide specialized materials expertise, recommend solutions to engineering problems, develop standards and procedures, conduct collaborative research, and exchange information.

D. Other Duties 05%

Performs a variety of special studies, project management activities, and other duties as assigned by supervisors in support of the Department mission and Division objectives. This includes exchanging information with contractors, agency staff, and the public; providing training, education, and professional and technical assistance; directing special projects; and attending ongoing education and training.

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1. ***The following duties and/or specific tasks listed under section II above are considered "essential functions" because they require specialized expertise and skill and are the primary reasons the job exists (they must be performed by this position with or without accommodations):***

Duty A: Materials research and analysis
Duty B: Report generation
Duty C: Pavement research and special studies

The following mental and physical demands are associated with these essential functions:

PHYSICAL

- Light lifting and carrying (less than 10 lbs.)
- Remaining seated for extended periods of time, with occasional walking; standing; bending
- Traveling within the state to project locations, and out of state travel by airline to national conferences and meetings.
- Operating a personal computer
- Communicating in writing, in person, and over the phone

MENTAL

- Interact with the public on a regular basis
- Ability to multi-task
- Requirement for accuracy in all aspects of work
- Ability to meet inflexible deadlines
- Decision making that affects public health and safety
- Computing arithmetic operations
- Comparing data
- Compiling information
- Analyzing and synthesizing data
- Coordinating
- Negotiating
- Instructing

2. Does this position supervise others? ☐ **Yes** ☑ **No**

Number directly supervised:
Position Number(s) of those supervised:

3. Attach an Organizational Chart.

SECTION III - Minimum Qualifications - List minimum requirements for the first day of work.

Critical knowledge and skills required for this position:

KNOWLEDGE: The CE Specialist requires knowledge of the concepts and theories of civil engineering, mathematics, statistics, and the physical sciences; computer technology; technical research and analysis methods and procedures; highway economic, safety, and efficiency issues; Engineering Division objectives and Materials Bureau goals; State, federal, AASHTO, and FHWA standards; highway construction methods and techniques; project management and documentation; construction methods and practices; material specifications; and supervisory methods and techniques.

SKILLS: The CE Specialist requires skill in analyzing and interpreting technical data; operating specialized information systems; project management; planning and organizing the work of others; motivating subordinates; drawing conclusions and making recommendations based upon technical analyses and professional judgments; and communicating complex technical information to varied audiences.

Behaviors required to perform these duties:

See MDT Core Behaviors

Education:
Check the one box indicating minimum education requirements for this position for a new employee the first day of work:

- ☐ No education required
- ☐ High school diploma or equivalent
- ☐ 1-year related college/voc. training
- ☐ Related AAS/2-years college/vocational training
- ☑ Related Bachelor's Degree
- ☐ Related Master's degree

Please specify the acceptable fields of study:

Acceptable: Requires a Bachelor's degree in Civil Engineering, Civil Engineering Technology, Construction Engineering Technology, or a related field.

Other education, training, certification, or licensing required (specify): An EIT/FE certification is required. A P.E. license is preferred.

Experience:
Check the one box indicating minimum work-related experience requirements for this position for a new employee the first day of work:

- ☐ No prior experience required
- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☑ 4 years
- ☐ 5 or more years

Other specific experience (optional):

Alternative Qualifications:
This agency will accept alternative methods of obtaining necessary qualifications.

☑ Yes ☐ No

Alternative qualifications include: A related engineering Master's degree may be substituted for two years of required work experience.

SECTION IV – Other Important Job Information

☐ Fingerprint check

☐ Valid driver's license

☐ Background check

☐ Other; Describe

Other information including working conditions such as shifts, lifting requirements, travel or hours.

This position requires some travel often requiring over-night stays away from the Helena area.

SECTION V – Signatures

Signature indicates this statement is accurate and complete.

Employee:

Name: _____ Title: _____

Signature: _____ Date: _____

Immediate Supervisor:

Name: _____ Title: _____

Signature: _____ Date: _____

Bureau Chief:

Name: _____ Title: _____

Signature: _____ Date: _____

Division/District Administrator:

Name: _____ Title: _____

Signature: _____ Date: _____

Department Designee:

Jennifer Jensen/Designee — Chief Human Resources Officer, Human Resources Division

Signature: _____ Date: _____